CLAIMS

1. A fuel cell system which performs power generation by means of an electrochemical reaction of a fuel gas and an oxidant gas, comprising:

fuel cells (1) each of which comprises an anode (2) which contacts the fuel gas, a cathode (3) which contacts the oxidant gas, and an electrolyte membrane (10) held between the anode (2) and cathode (3);

a moisture-adjusted gas generating mechanism (4, 5) which generates moisture-adjusted gas at an arbitrary humidity; and

a programmable controller (7) programmed to:

determine a target humidity based on a temperature of the fuel cells (1) after power generation is halted (S2, S12, S25);

control the gas generating mechanism (4, 5) such that the humidity of the moisture-adjusted gas matches the target humidity (S2, S12, S25); and

control the moisture-adjusted gas generating mechanism (4, 5) to supply the moisture-adjusted gas adjusted to the target humidity to at least one of the anode (2) and cathode (3) after power generation in the fuel cells (1) is halted (S3, S13, S26).

2. The fuel cell system as defined in Claim 1, wherein the moisture-adjusted gas comprises one of a humidified fuel gas and a humidified oxidant gas.

3. The fuel cell system as defined in Claim 1, wherein the moisture-adjusted

gas comprises a humidified fuel gas and a humidified oxidant gas, the gas generating mechanism (4, 5) comprises a first humidifier (4) which humidifies the fuel gas to generate the humidified fuel gas and a second humidifier (5) which humidifies the oxidant gas to generate the humidified oxidant gas; and the controller (7) is further programmed to control the moisture-adjusted gas generating mechanism (4, 5) such that after power generation in the fuel cells (1) is halted, fuel gas adjusted to the target humidity is supplied to the anode (2) by the first humidifier (4), and oxidant gas adjusted to the target humidity is supplied to the cathode (3) by the second humidifier (5) (S3, S16, S26).

4. The fuel cell system as defined in Claim 1, wherein the controller (7) is further programmed to set the target humidity higher as the temperature of the fuel cells (1) increases (S2, S12, S25).

5. The fuel cell system as defined in Claim 1, wherein the controller (7) is further programmed to control the moisture-adjusted gas generating mechanism (4, 5) such that the supply of moisture-adjusted gas is halted when a predetermined period of time elapses following the commencement of moisture-adjusted gas supply by the gas generating mechanism (4, 5).

6. The fuel cell system as defined in Claim 1, wherein the fuel cell system further comprises a sensor (8, 15) which detects a wet condition of the fuel cells (1), and the controller (7) is further programmed to set the target humidity higher when the wet condition of the fuel cells (1) is drier than a predetermined

wet region than when the wet condition of the fuel cells (1) is wetter than the predetermined wet region (S12, S25).

7. The fuel cell system as defined in Claim 6, wherein the controller (7) is further programmed to modify the target humidity according to the wet condition of the fuel cells (1), which varies during the supply of moisture-adjusted gas by the gas generating mechanism (4, 5), and to control the gas generating mechanism (4, 5) such that the humidity of the moisture-adjusted gas matches the modified target humidity (S12, S25).

8. The fuel cell system as defined in Claim 7, wherein the controller (7) is further programmed to control the moisture-adjusted gas generating mechanism (4, 5) such that when the temperature and the wet condition of the fuel cells (1) reach a predetermined state of equilibrium, the supply of moisture-adjusted gas is halted (S28, S29).

9. The fuel cell system as defined in Claim 6, wherein the sensor (8, 15) which detects the wet condition of the fuel cells (1) is constituted by a sensor (15) which measures electrical resistance between the anode (2) and cathode (3).

10. The fuel cell system as defined in Claim 1, wherein the fuel cell system comprises a fuel cell stack (50) comprising a stacked body of a plurality of the fuel cells (1), a moisture-adjusted gas inlet (51a, 51b) for supplying the moisture-adjusted gas from the moisture-adjusted gas generating mechanism (4, 5) to

each of the fuel cells (1), and a moisture-adjusted gas outlet (52a, 52b) for discharging from the fuel cell stack (50) the moisture-adjusted gas which has discharged from each of the fuel cells (1), a first sensor (8a) which detects the wet condition of the fuel cell stack (50) in the vicinity of the inlet (51a, 51b) and a second sensor (8b) which detects the wet condition of the fuel cell stack (50) in the vicinity of the outlet (52a, 52b), and the controller (7) is further programmed to set the target humidity of the moisture-adjusted gas on the basis of the wet condition of the fuel cell stack (50) in the vicinity of the inlet (51a, 51b), and to determine when to halt the supply of moisture-adjusted gas on the basis of the wet condition of the fuel cell stack (50) in the vicinity of the outlet (52a, 52b).

11. The fuel cell system as defined in any one of Claim 1 through Claim 10, wherein the fuel cell system further comprises a sensor (9) which detects an outside air temperature, and the controller (7) is further programmed to control the moisture-adjusted gas generating mechanism (4, 5) such that, when the outside air temperature after power generation in the fuel cells (1) is halted deviates from a predetermined temperature region, the supply of the moisture-adjusted gas is halted (S22, S30).

12. The fuel cell system as defined in any one of Claim 1 through Claim 10, wherein the target humidity is set between fifteen percent and ninety-five percent.

13. The fuel cell system as defined in any one of Claim 1 through Claim 10, wherein the moisture-adjusted gas generating mechanism (4, 5) comprises a mechanism (4) which supplies humidified moisture-adjusted gas to the anode (2) after power generation in the fuel cells (1) is halted, and a mechanism (5) which supplies humidified moisture-adjusted gas to the cathode (3) after power generation in the fuel cells (1) is halted, and the controller (7) is further programmed to set the target humidity of the moisture-adjusted gas that is supplied to the anode (2) after power generation in the fuel cells (1) is halted higher than the target humidity of the moisture-adjusted gas that is supplied to the cathode (3) after power generation in the fuel cells (1) is halted.

14. The fuel cell system as defined in any one of Claim 1 through Claim 10, wherein the fuel cell system further comprises a sensor (6) which detects the temperature of the fuel cells (1).

15. A moisture control method of fuel cell system which performs power generation by means of an electrochemical reaction of a fuel gas and an oxidant gas, and comprises fuel cells (1) each of which comprises an anode (2) which contacts the fuel gas, a cathode (3) which contacts the oxidant gas, and an electrolyte membrane (10) held between the anode (2) and cathode (3), and a moisture-adjusted gas generating mechanism (4, 5) which generates moisture-adjusted gas at an arbitrary humidity; the method comprising:

determining a target humidity based on a temperature of the fuel cells (1) after power generation is halted (S2, S12, S25);

controlling the moisture-adjusted gas generating mechanism (4, 5) such that the humidity of the moisture-adjusted gas matches the target humidity (S2, S12, S25); and

controlling the gas generating mechanism (4, 5) to supply the moisture-adjusted gas adjusted to the target humidity to at least one of the anode (2) and cathode (3) after power generation in the fuel cells (1) is halted (S3, S13, S26).